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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
DHINGRA, RAKESH KUMAR	
ART UNIT	**PAPER NUMBER**
1763	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/629,566	LOPES CARDOZO ET AL.	
	Examiner	Art Unit	
	Rakesh K. Dhingra	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6, 8-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3-5, 8 are rejected under 35 U.S.C 103(a) being unpatentable over Schram et al (EP Pub. No. 0 297 637 A1 equivalent to US Patent No. 4,871,580) in view of Maishev et al (US Patent No. 6,236,163).

Regarding Claim 1: Schram et al teach a plasma apparatus (Figures 1, 2) for treating a surface of a substrate, comprising:

a treatment chamber 3 for receiving the substrate 9 therein,

at least one plasma source 13 for generating a plasma, which plasma source is connected to the treatment chamber, and comprising inlet means (gas inlets) 11, 12 for admitting at least one reactant into a flow path of the plasma,

wherein the plasma source comprises at least one cathode 20 (cathode tip) and at least one anode 5 between which a system of at least one cascade plate 26 is received, wherein the cascade plate (central channel) openings 19 respectively define at least substantially straight path between the source 13 and the substrate 9, and

between the at least one cathode 20 and the system of at least one cascade plates 26 there is a plasma space present, which is in open communication with the central channel (passage openings) 19. Though Schram et al do not explicitly teach plasma space between cathode and first cascade plate and being in open communication with plasma channel, but such common plasma space would inherently be created between cathode tip 20 and first cascade plate (Figure 2) that would also be in open communication with central channel 19 and direct plasma through central channel (plasma flow path) in the cascade plate assembly 26 (Column 4, line 50 to Column 6, line 35).

Schram et al do not teach plurality of passage openings in cascade plate for the passage of plasma.

Maishev et al teach a plasma apparatus 200 (Figure 5) that has a cathode plate 240 with plurality of slits (plasma passage opening) 252a and where a plasma 258 is formed between anodes 254 and cathode 240 such that plural beams propagate in separate directions A1, A2 and cover different portions of surface OB1 (object being treated) and

ensure uniform treatment on a large surface area (Column 7, line 25 to Column 8, line 35).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of plasma passage openings as taught by Maishev et al in the apparatus (cascade plates) of Schram et al in order to obtain plural beams that would enable uniform surface treatment on a large surface area (Column 8, lines 55-60).

Regarding Claims 3, 8: Schram et al in view of Maishev et al teach that three or more ion beam sources (having 3 or more passage openings) can be used in a single multiple beam assembly (Maishev et al - Column 13, lines 1-6).

In this connection courts have ruled (Case Law):

"Duplication of parts was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960)."

" The motivation to make a specific structure is always related to the properties or uses one skilled in the art would expect the structure to have. *In re Newell* 13 USPQ 2d 1248, 1250 (Fed. Cir. 1989); *Fromson v. Advance Offset Plate* 225 USPQ 26, 31 (Fed. Cir. 1985); *In re Gyurik* 201 USPQ 552, 557 (CCPA 1979)."

Regarding Claim 4: Schram et al teach (Figure 3) that the gas inlet means are adapted to admit the reactant, on a side of the adjacent cascade plate 45 remote from the plasma space, into flow path 19 of the plasma extending through the openings.

Regarding Claim 5: Schram et al in view of Maishev et al teach that the apparatus has one common cathode 240 and there are plurality of slits (passage openings) 252a for emitting the plasma beams (Column 7, lines 60-65).

In this connection courts have ruled (Case Law):

" The motivation to make a specific structure is always related to the properties or uses one skilled in the art would expect the structure to have. *In re Newell* 13 USPQ 2d 1248, 1250 (Fed.

Cir. 1989); *Fromson v. Advance Offset Plate* 225 USPQ 26, 31 (Fed. Cir. 1985); *In re Gyurik* 201 USPQ 552, 557 (CCPA 1979)."

Claim 2 is rejected under 35 U.S.C 103(a) being unpatentable over Schram et al (EP Pub. No. 0 297 637 A1 equivalent to US Patent No. 4,871,580) in view of Maishev et al (US Patent No. 6,236,163) as applied to claim 1 and further in view of Yang et al (US Patent No. 6,397,776).

Regarding Claim 2: Schram et al in view of Maishev et al teach all limitations of the claim except distance between passage openings.

Yang et al teach an apparatus (Figures 1, 4) using plurality of plasma generating means 15 (cathode 413, anode 419, cascade plates 426, gas supply means 417) to efficiently coat large substrates with good uniformity. Yang et al teach that spacing of plasma generating means has an effect on uniformity of coating and is preferred to provide spacing such that there is overlap between edge portions of the plurality of plasma plumes. Yang et al further teach that optimum spacing for plasma generation means would depend upon process parameters and can be determined/optimized by simple experimentation (Column 2, line 45 to Column 6, line 35).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use optimum distance as per process parameters as taught by Yang et al in the apparatus of Schram et al in view of Maishev et al to obtain uniform surface treatment on a large surface area (Column 6, lines 22-35).

Claim 6 is rejected under 35 U.S.C 103(a) being unpatentable over Schram et al (EP Pub. No. 0 297 637 A1 equivalent to US Patent No. 4,871,580) in view of

Maishev et al (US Patent No. 6,236,163) as applied to Claim 1 and further in view of Schaepkens (US patent No. 6,681,716).

Regarding Claim 6: Schram et al in view of Maishev et al teach all limitations of the claim except that one cathode is provided per passage opening.

Schaepkens teaches a multiple plasma source apparatus (Figures 1a, 2) for depositing large area coatings on substrates. Schaepkens further teaches (Figure 2) that each plasma source 212 includes a cathode 214, an anode 216, opening 206 and a gas inlet 218 which are disposed in a plasma chamber 202 in order to obtain uniform coating on large areas (column 4, line 40 to Column6, line 68).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use one cathode per passage opening (for each plasma source) as taught by Schaepkens in the apparatus of Schram et al in view of Maishev et al to deposit uniform coating on large area surfaces (Column 1, line 50 to Column 2, line 50).

Claim 9 is rejected under 35 U.S.C 103(a) being unpatentable over Schram et al (EP Pub. No. 0 297 637 A1 equivalent to US Patent No. 4,871,580) in view of Maishev et al (US Patent No. 6,236,163) and Yang et al (US Patent No. 6,397,776) as applied to Claim 2 and further in view of Schaepkens (US Patent No. 6,681,716).

Regarding Claim 9: Schram et al in view of Maishev et al and Yang et al teach all limitations of the claim except that one cathode is provided per passage opening.

Schaepkens teaches a multiple plasma source apparatus (Figures 1a, 2) for depositing large area coatings on substrates. Schaepkens further teaches (Figure 2) that each

plasma source 212 includes a cathode 214, an anode 216, opening 206 and a gas inlet 218 which are disposed in a plasma chamber 202 in order to obtain uniform coating on large areas (column 4, line 40 to Column6, line 68).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use one cathode per passage opening (for each plasma source) as taught by Schaepkens in the apparatus of Schram et al in view of Maishev et al and Yang et al to deposit uniform coating on large area surfaces (Column 1, line 50 to Column 2, line 50).

Claim 10 is rejected under 35 U.S.C 103(a) being unpatentable over Schram et al (EP Pub. No. 0 297 637 A1 equivalent to US Patent No. 4,871,580) in view of Maishev et al (US Patent No. 6,236,163).

Regarding Claim 10: Schram et al teach an apparatus for treating surface of a substrate, comprising:

a treatment chamber 3 for receiving a substrate 9 therein with an exposed, to-be-treated substrate area;

a plasma source 13 for generating plasma beam and the beam exiting the plasma source to cover the substrate area;

the plasma source comprising a plasma reactant inlet 11, cathode (tip) 20, and an anode 5;

a system of aligned cascade plates 26 located between the cathode and anode,

the cascade plates each containing plasma passage opening, the passage opening of each cascade plate being aligned to define central (plasma) channel 19, the channel

defining a plasma flow path. Though Schram et al do not explicitly teach plasma space between cathode and first cascade plate and being in open communication with plasma channel, but such common plasma space would inherently be created between cathode tip 20 and first cascade plate (Figure 2) that would also be in open communication with central channel 19 and direct plasma through central channel (plasma flow path) in the cascade plate assembly 26 (Column 4, line 50 to Column 6, line 35).

Schram et al do not teach plurality of passage openings in cascade plate and corresponding plural separate plasma flow paths.

Maishev et al teach a plasma apparatus 200 (Figure 5) that has a cathode plate 240 with plurality of slits (plasma passage opening) 252a and where a plasma 258 is formed between anode 254 and cathode 240 such that beams propagate in separate directions A1, A2 and cover different portions of surface OB1 (object being treated) and ensure uniform treatment on a large surface area (Column 7, line 25 to Column 8, line 35).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of plasma passage openings as taught by Maishev et al in the apparatus (cascade plates) of Schram et al in order to obtain plural separate beams (plural plasma flow paths) that would enable uniform treatment on a large surface area (Column 8, lines 55-60).

Claim 11 is rejected under 35 U.S.C 103(a) being unpatentable over Schram et al (EP Pub. No. 0 297 637 A1 equivalent to US Patent No. 4,871,580) in view of Maishev et al (US Patent No. 6,236,163).

Regarding Claim 11: Schram et al teach a substrate treatment apparatus comprising;

a treatment chamber 3;

substrate holder 10, within the treatment chamber for holding a substrate 9 to be treated including an exposed substrate area;

Though Schram et al do not explicitly teach plasma space to accumulate plasma but such common plasma space would inherently be created between cathode tip 20 and first cascade plate (Figure 2) that would also be in open communication with central channel 19 and direct plasma through central channel (plasma flow path) in the cascade plate assembly 26;

a plasma source 13 accepting accumulated plasma from the common plasma space with plasma inlet nozzle (discharge) 4 located opposite the substrate holder 10,

discharge providing plasma beam directed toward the substrate holder 10 so that plasma beam is directed to cover exposed substrate area,

the plasma source comprising at least one cascade plate 26 located between an anode 5 and a cathode (tip) 20,

the cascade plate comprising central channel (plasma passage opening) 19, the passage opening aligned to form plasma channel defining plasma flow path, wherein,

the common plasma space is located between the cathode 20 and cascade plate 26,

the common plasma space is in open communication with the plasma channel,

the common plasma space accumulates plasma and enables the accumulated plasma over the central (plasma) channel 19,

exiting the plasma source at the plasma inlet (discharge) 4, via the plasma channel 19, is the plasma beam directed to cover the exposed substrate area (Column 4, line 50 to Column 6, line 35).

Schram et al do not teach plurality of passage openings in cascade plate and corresponding plural separate plasma flow paths from which plasma beams exit to cover different portion of exposed substrate area.

Maishev et al teach a plasma apparatus 200 (Figure 5) that has a cathode plate 240 with plurality of slits (plasma passage opening) 252a and where a plasma 258 is formed between anodes 254 and cathode 240 such that beams propagate in separate directions A1, A2 and cover different portions of surface OB1 (object being treated) and ensure uniform treatment on a large surface area (Column 7, line 25 to Column 8, line 35).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of plasma passage openings as taught by Maishev et al in the apparatus (cascade plates) of Schram et al in order to obtain plural separate beams (plural plasma flow paths) that would enable uniform treatment on a large surface area (Column 8, lines 55-60).

Response to Arguments

Applicant's arguments with respect to claims 1- 9 have been considered but are moot in view of the new ground(s) of rejection as explained below:

Applicant has amended Claim 1 by adding new limitations “plate openings respectively define at least” and “straight paths between the source and the substrate”. Further,

applicant argues (page 10 onwards of applicant's remarks) that references by Schram et al and Maishev et al in combination or individually do not teach recitation of the invention as per amended claim. Specifically applicant argues that device comprises plasma space between cathode and the system of cascade plates.

Examiner responds that although Schram et al do not explicitly teach plasma space between cathode and first cascade plate and being in open communication with plasma channel, but as per teaching of Schram et al such a common plasma space would inherently be created between cathode tip 20 and first cascade plate (Figure 2) that would also be in open communication with central channel 19 and thus direct plasma through central channel (plasma flow path) in the cascade plate assembly 26 (Column, line 40 to Column 6, line 45).

Applicant also argues that each of the cascade plates contain plural passage openings which are aligned with other and the plasma from plasma space is distributed through these plural passage openings in cascade plate as separate plural beams covering a separate substrate area and the prior art as modified and combined does not teach such a device.

Examiner responds that Schram et al teach a plasma device with cascade plates having single passage that forms plasma path and through which beam exits to cover the substrate. Maishev et al teach a multiple beam ion source assembly that gives uniform treatment on large area substrates. Specifically, Maishev et al a plasma apparatus 200 (Figure 5) that has a cathode plate 240 with plurality of slits (plasma passage opening) 252a and where a plasma 258 is formed between plurality of anodes 254 and cathode

240 such that plural beams propagate in separate directions A1, A2 and cover different portions of surface OB1 (object being treated) and ensure uniform treatment on a large surface area (Maishev et al – Figures 5 and Column 7, line 25 to Column 8, line 35). Even though the plurality of anodes 240 with a common cathode 240 act as plural plasma sources but these are part of a single ion beam assembly capable of generating multiple beams that pass through separate and plural passage openings to cover treatment of large area substrates. Here teaching of Maishev et al has been used to bring in the concept of multiple beams exiting through plurality of openings (passages) with the motivation that it enables to cover treatment of large area substrates which is not taught by Schram et al. Thus it would be obvious to combine the teaching of Maishev et al with those of Schram et al. Accordingly Claims 1, 3-5, 8 have been rejected as explained above.

Applicant also argues that similar arguments (as for Schram et al and Maishev et al) apply to Yang et al and Schaepkens since both these disclose apparatus with multiple plasma generating means for large area substrates and do not disclose cascade plates with multiple openings.

Examiner responds that references by Yang et al and Schaepkens were combined with teachings of Schram et al and Maishev et al as these were reading on the dependent claims 2, 6, 9 in view of comments given above. Accordingly claims 2, 6, 9 have been rejected as explained above.

Further new claims 10, 11 have also been rejected based on teachings of Schram et al in view of Maishev et al and as explained above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rakesh K Dhingra

Parviz Hassanzadeh
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